MODULE SPECIFICATION PROFORMA

Module Code:	LND307

Module Title:	Introduction to Experimental Design and Mathematical Analysis

Level:	3	**Credit Value:**	20

Cost Centre(s):	GAHT	JACS3 **code**:	G120

School:	Social & Life Sciences	**Module Leader:**	Dr Ian Ratcliffe

Scheduled learning and teaching hours	50 hrs
Guided independent study	150 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Guidance - normally, the university would expect to see the following amounts of contact time and independent learning time for taught modules as part of its Modular Curriculum Framework –

Level	*Credit volume*	*Overall learning hours*	*Contact learning hours*	*Independent learning hours*
Level 3	*20 credits*	*200 hrs*	*40*	*160*
Level 4	*20 credits*	*200 hrs*	*36*	*164*
Level 5	*20 credits*	*200 hrs*	*30*	*170*
Level 6	*20 credits*	*200 hrs*	*24*	*176*
Level 7	*20 credits*	*200 hrs*	*21*	*179*

Programme(s) in which to be offered (not including exit awards)	Core	Option
BSc (Hons) Equine Science and Welfare Management (including Foundation Yr)	✓	☐
FdSc Animal Studies (including Foundation Yr)	✓	☐
BSc (Hons) Forensic Science (including Foundation Yr)	✓	☐
BSc (Hons) Animal Science (including Foundation Yr)	✓	☐

Pre-requisites
None

Office use only

Initial approval: Sept 2014 Version no:

With effect from: Sept 2018

APSC Date and details of revision: 12/9/18 Version no:1

Module Aims

- To appreciate the use of scientific methods and concepts
- To understand the principles of experimental design
- To appreciate methods in the interpretation and analysis of data

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Explain and apply mathematical notation and algebraic expressions.	KS1	KS10
		KS2	
		KS6	
2	Draw graphs and determine their gradients.	KS1	KS10
		KS3	
		KS4	
3	Interpret basic statistics and examples of probability and demonstrate their applications in science	KS1	KS10
		KS4	
		KS5	
4	Design a laboratory experiment and collect observations	KS1	KS10
		KS3	KS6
		KS5	
5	Apply principles to the analysis and interpretation of data	KS1	KS10
		KS3	
		KS6	

Transferable skills and other attributes

Problem solving

- Mathematical applications
- Design, analysis, and synthesis
- ICT
- Presentation skills

Derogations
None

Assessment:
Indicative Assessment Tasks:
Assessment One: Presentation of data analysis from a short experiment designed and undertaken by the student. **Assessment Two:** Written assignment comprising completion of a small number of 'long answer' mathematical problems. **Assessment Three:** Exam on mathematical problems. This will be conducted as an open book assessment

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	4,5.	Presentation	40	10 mins	
2	2,3	Coursework	30		
3	1	Examination	30	1.5 hours	

Learning and Teaching Strategies:
The module will be presented to students through a series of lectures and learning reinforced through module tutor guided and self-directed study and interactive problem-solving tutorial sessions utilising laboratory equipment where appropriate. Formative assessment involves tutorial questions and summative assessment is by In-Class Tests/examinations and presentation.

Syllabus outline:
Use of theories and models to explain observations and cause and effect in science Numbers, scientific notation and significant figures. Algebra and manipulation of algebraic expressions. Powers, indices, exponentials and logarithms. Some simple rules of differentiation. Integration: reversing differentiation. Experimental design Dependent and independent variables Accuracy and precision Sampling Replication Reproducibility Data analysis Producing and interpreting graphs Averages Percentages Introduction to probability. Use of statistics in experimental analysis Normal distribution. Basic t-test. Use of ICT in data analysis

Indicative Bibliography:

Essential reading

Ruxton, G.D. & Colegrave, N. (2016) *Experimental Design for the Life Sciences*. Oxford: Oxford University Press

Other indicative reading

Lawler, G. (2011) *Understanding Maths: Basic Mathematics Explained.* 4th ed. Conway:Aber Publishing.
Stroud, K.A. & Booth, D.J. (2009) *Foundation Mathematics*. London: Palgrave Macmillan
Page, S., Berry, J. & Hampson, H. (2002) *Mathematics - A Second Start.* 2nd ed. Cambridge: Woodhead Publishing.